The First Law of Inward Physics: A Field-Theoretic Law of Endogenous Registration

Daniel Jacob Read IV
Independent Researcher
(self-published)

January 5, 2026

Abstract

This document presents a formal statement of a proposed physical law within the framework of *Inward Physics*. The law introduces a scalar memory-field $\mu(x,t)$ that accumulates irreversible registration through endogenous coherence, resulting in exponential suppression of future variance in stochastic systems. The formulation renders system history a causal state variable without invoking external control, retrocausality, or observer dependence. Validation is limited to computational simulations. This work constitutes a theoretical construct.

1. Formal Law Statement

First Law of Inward Physics (Proposed). In any stochastic system admitting endogenous coherence, accumulated inward registration suppresses future variance as an exponential function of registered history.

Let $\mu(x,t)$ be a scalar memory-field defined over spacetime. Define accumulated registration:

$$A(x,t) = \int_0^t \mu(x,\tau)\, d\tau. \tag{1}$$

The system variance evolves according to:

$$\sigma^2(x,t) = \sigma_0^2 \exp\left(-\kappa A(x,t)\right), \tag{2}$$

where σ_0^2 is the initial variance and $\kappa > 0$ is the registration coupling constant.

Accumulated registration is irreversible under bounded perturbations. History therefore functions as a causal state variable.

2. Field Dynamics

The memory-field evolves according to:

$$\frac{\partial \mu}{\partial t} = D\nabla^2 \mu - \frac{\partial V(\mu)}{\partial \mu} + \eta(x,t), \tag{3}$$

where D is a diffusion coefficient, $\eta(x,t)$ is stochastic noise, and $V(\mu)$ is an inward potential.

To permit hysteresis and irreversibility, the potential includes non-quadratic terms:

$$V(\mu) = \frac{1}{2}a\mu^2 + \frac{1}{3}b\mu^3 + \frac{1}{4}c\mu^4. \tag{4}$$

These terms generate multiple attractors and prevent reset of accumulated registration.

3. Simulation Observations

Ensemble simulations under impulse shocks of magnitude $\alpha \in [2,5]$ reveal three qualitative regimes:

- **Unregistered Regime**: Variance diffuses without bound.
- **Inward-Stable Regime**: Variance remains bounded and recovers after shocks.
- **Brittle Regime**: Suppression persists but coherence becomes fragile.

In the inward-stable regime, accumulated registration was not erased by shocks, indicating irreversibility.

4. Temporal Loop Constraint

An anticipatory constraint of the form

$$\mu(t) \to \mu(t) + \lambda\langle\mu(t+\Delta t)\rangle \tag{5}$$

was introduced, where λ is a coupling parameter.

This mechanism accelerated stabilization without retrocausal signaling, reducing ensemble variance by approximately 32% relative to unconstrained dynamics.

5. Cross-Scale Coupling

Emergent stability across scales was modeled using the interaction term:

$$\mathcal{L}_{\text{int}} = \alpha\,\mu_{\text{micro}}\mu_{\text{macro}}, \tag{6}$$

allowing inward registration at one scale to propagate coherence to another without parameter fine-tuning.

6. Falsifiability

The proposed law is falsified if any of the following occur:

1. Absence of exponential variance suppression with increasing $A(x,t)$.
2. Reset of accumulated registration under bounded shocks.

3. Failure of hysteresis under non-quadratic potentials.

4. No propagation of stability under cross-scale coupling.

7. Scope

This work is limited to theoretical formulation and computational simulation. No empirical validation beyond simulation is claimed. Interpretive descriptions are non-metaphysical and non-psychological.

Copyright and Authorship

© 2026 Daniel Jacob Read IV. All rights reserved.

No part of this document may be reproduced, distributed, or transmitted in any form or by any means without prior written permission from the author. Authorship and priority are asserted by publication date.

Version: 1.0